

Exhibit 12

OnePlus - Smartphone (Models having cameras with IR sensitivity. See Product List at end for models)

Infringement of the '413 patent

Claim 1

1. A mobile communication device comprising a computational means and output means,

Evidence

The OnePlus smartphone is a mobile communication device that has a computational means and an output means.

For example, the OnePlus smartphone is a mobile communication device that includes a system-on-chip (SoC), which includes a main processor as a computational device, and a touchscreen as an output device.


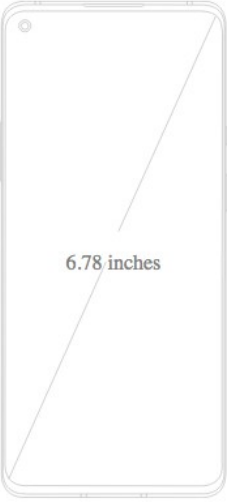
For example, the OnePlus 8 Pro includes a Qualcomm Snapdragon SoC CPU device and an AMOLED touchscreen display:

OnePlus 8 Pro

[+ Compare with OnePlus 8](#)

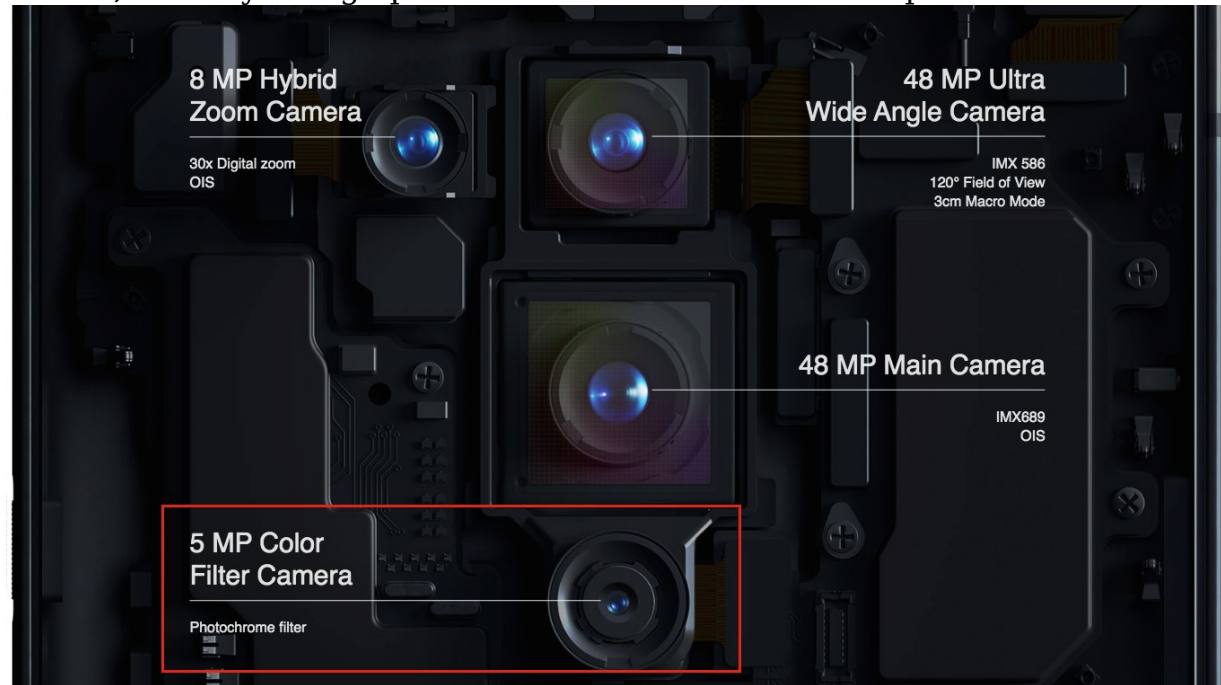


[1]

	<p><u>Performance</u></p> <p>Operating System: OxygenOS based on Android™ 10 CPU: Qualcomm® Snapdragon™ 865 5G Chipset: X55 GPU: Adreno 650 RAM: 8GB/12GB LPDDR5 Storage: 128GB/256GB UFS 3.0 2-LANE Battery: 4510 mAh (non-removable) Warp Charge 30T Fast Charging (5V/6A) 30W Wireless Charging</p>  <p>[1]</p> <p><u>Display</u></p> <p>Parameters</p> <p>Size: 6.78 inches(The corners of the screen are within a standard rectangle. Measured diagonally, the screen size is 6.78 inches in the full rectangle and 6.55 inches accounting for the rounded corners.) Resolution: 3168 x 1440 pixels 513 ppi Aspect Ratio: 19.8:9 Type: Fluid AMOLED Support sRGB, Display P3 Cover Glass: 3D Corning® Gorilla® Glass</p> <p>Features</p> <p>Adaptive Display Vibrant Color Effect Pro Motion Graphics Smoothing Reading Mode Night Mode</p>  <p>[1]</p>
further comprising a module incorporating a non-contact temperature sensor for	The OnePlus smartphone further includes a module incorporating a non-contact temperature sensor for receiving from an external surface electromagnetic radiation in the infrared spectral range.

receiving from an external surface electromagnetic radiation in the infrared spectral range,

For example, the OnePlus 8 Pro smartphone includes an IR camera, (5MP Color Filter Camera) which is a smartphone module that is capable of sensing infrared electromagnetic radiation from an external source in a non-contact manner, thereby being operational as a non-contact temperature sensor.



[1]

The OnePlus 8 Pro's Infrared Camera Can See Through Plastic and More

MAY 15, 2020 DL CADE



The new [OnePlus 8 Pro](#) is a great Android phone for lots of reasons. It's got a 120Hz display, Snapdragon 865, and a quad-camera system with not one, but two 48MP Sony sensors inside. But that's not why it's making headlines. It's making headlines because of its 5MP infrared camera, which can actually see *through* some materials.

[2]

	<p>This effect is made possible by the 5MP 'Color Filter' camera used to create what OnePlus has dubbed the 'Photochrom' effect. But that's just marketing speak. It's no mystery what this camera is: a sensor with the IR filter removed, so it can capture infrared light in addition to visible wavelengths.</p> <p>And while OnePlus expected this mode to be used to create false color images and unique landscape shots, an upshot of this feature is that certain materials like certain thin plastics become see-through, allowing you to see inside remote controls or an Apple TV as if you have X-Ray vision.</p> <p>[2]</p>
such non-contact temperature sensor generates a signal.	<p>The non-contact temperature sensor of the OnePlus smartphone generates a signal.</p> <p>For example, the IR camera in the OnePlus 8 Pro model generates an IR image signal e.g. in which certain materials appear see-through because IR radiation penetrates them.</p>

TECH / CIRCUIT BREAKER / ONEPLUS

OnePlus 8 Pro has an accidental X-ray vision filter that sees through plastic and clothes



/ It's not actual X-ray, though, but infrared

By JAMES VINCENT

May 15, 2020, 5:49 AM EDT | 0 Comments / 0 New



Seeing into the guts of an Apple TV box. Images: Ben Geskin / Twitter

[3]

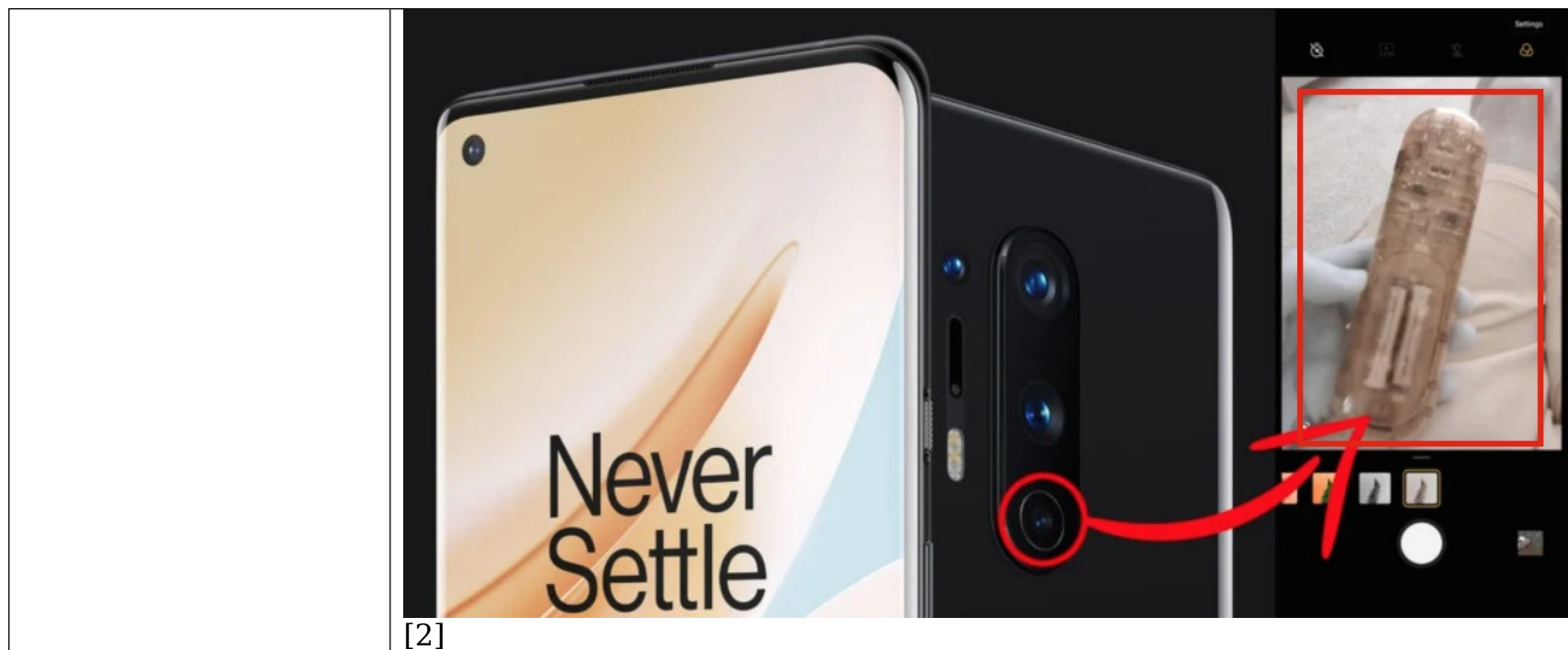
Infrared sits right below visible light in the electromagnetic spectrum, and is sometimes referred to as "heat radiation," because that's how we feel its effects. The world is saturated in infrared, but because we don't see it, we don't usually think about it. About half of the energy that arrives on the Earth from the Sun arrives as infrared, for example.

[3]

Special types of equipment can capture infrared radiation, including night vision goggles and thermal cameras. This allows you to see through certain materials, as infrared passes through them in a way visible light (which is all our eyes perceive) cannot. Firefighters, for example, use infrared cameras to see through smoke into burning buildings.

As high-end phones start incorporating infrared sensors too, it seems they can be used for this same purpose. And it's not just the OnePlus 8 Pro that can do it. The TrueDepth camera on recent iPhones, which use infrared light to scan your face for FaceID, can also be hijacked to create see-through images, as app developer Guilherme Rambo has demonstrated (though it seems you need a jailbroken iPhone to do this).

[3]



OnePlus - Smartphones (Models having cameras with IR sensitivity. See Product List at end for models)

Infringement of the '413 patent

Claim 8

8. A mobile communication device comprising a computational means and output means, further comprising:

Evidence

The OnePlus smartphone is a mobile communication device that has a computational means and an output means.

For example, the smartphone is a mobile communication device that includes a system-on-chip (SoC), which includes a main processor as a computational device, and a touchscreen as an output device.


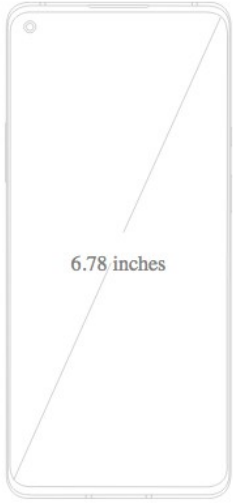
For example, the OnePlus 8 Pro includes a Qualcomm Snapdragon SoC CPU device and an AMOLED touchscreen display:

Performance

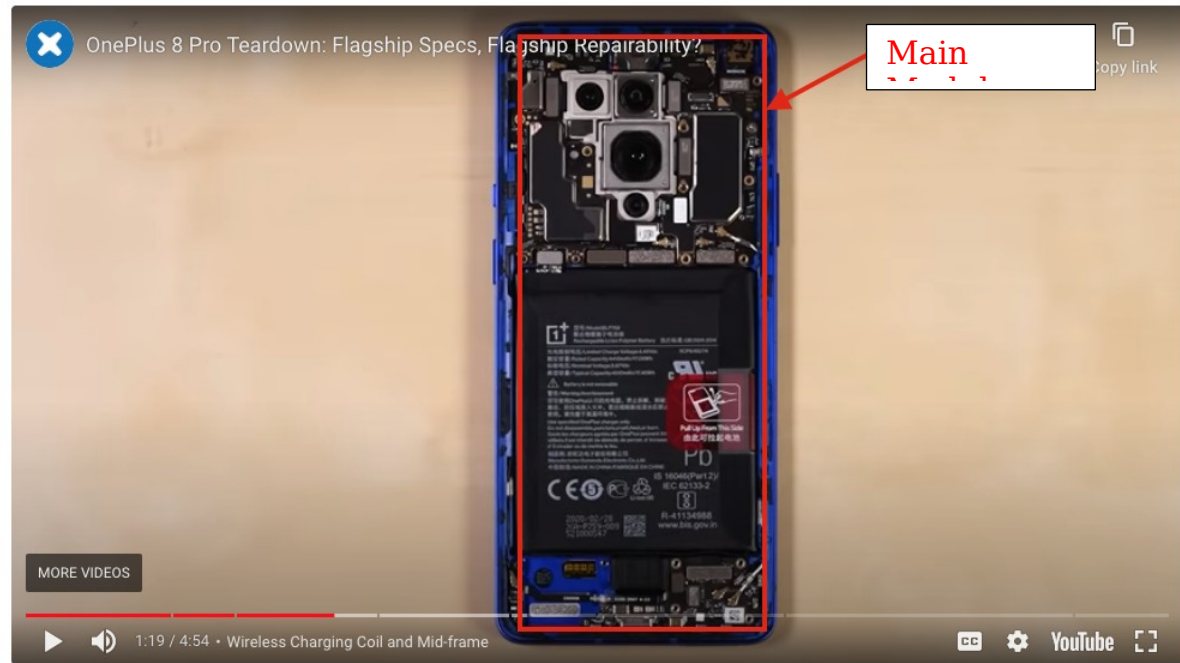
Operating System: OxygenOS based on Android™ 10
 CPU: Qualcomm® Snapdragon™ 865
 5G Chipset: X55
 GPU: Adreno 650
 RAM: 8GB/12GB LPDDR5
 Storage: 128GB/256GB UFS 3.0 2-LANE
 Battery: 4510 mAh (non-removable)
 Warp Charge 30T Fast Charging (5V/6A)
 30W Wireless Charging



[1]

	<p><u>Display</u></p> <p>Parameters</p> <p>Size: 6.78 inches(The corners of the screen are within a standard rectangle. Measured diagonally, the screen size is 6.78 inches in the full rectangle and 6.55 inches accounting for the rounded corners.) Resolution: 3168 x 1440 pixels 513 ppi Aspect Ratio: 19.8:9 Type: Fluid AMOLED  Support sRGB, Display P3 Cover Glass: 3D Corning® Gorilla® Glass</p> <p>Features</p> <p>Adaptive Display Vibrant Color Effect Pro Motion Graphics Smoothing Reading Mode Night Mode</p>  <p style="text-align: right;">[1]</p>
<p>a module for receiving and measuring a magnitude of electromagnetic radiation, wherein said electromagnetic radiation is generated by a source that is not being part of the mobile communication device,</p>	<p>The OnePlus smartphone further includes a module for receiving and measuring a magnitude of electromagnetic radiation, wherein the electromagnetic radiation is generated by a source that is not part of the mobile communication device.</p> <p>For example, the central module of the smartphone (e.g. OnePlus 8 Pro) is a module to which the Qualcomm Snapdragon SoC device and touchscreen are communicatively coupled during manufacturing of the smartphone. The main board of the smartphone includes an IR camera (5 MP Color Filter Camera), which is capable of sensing and measuring infrared electromagnetic radiation from a source that is not part of the smartphone, e.g. a source in a location at which the IR camera is aimed.</p>

Video Overview

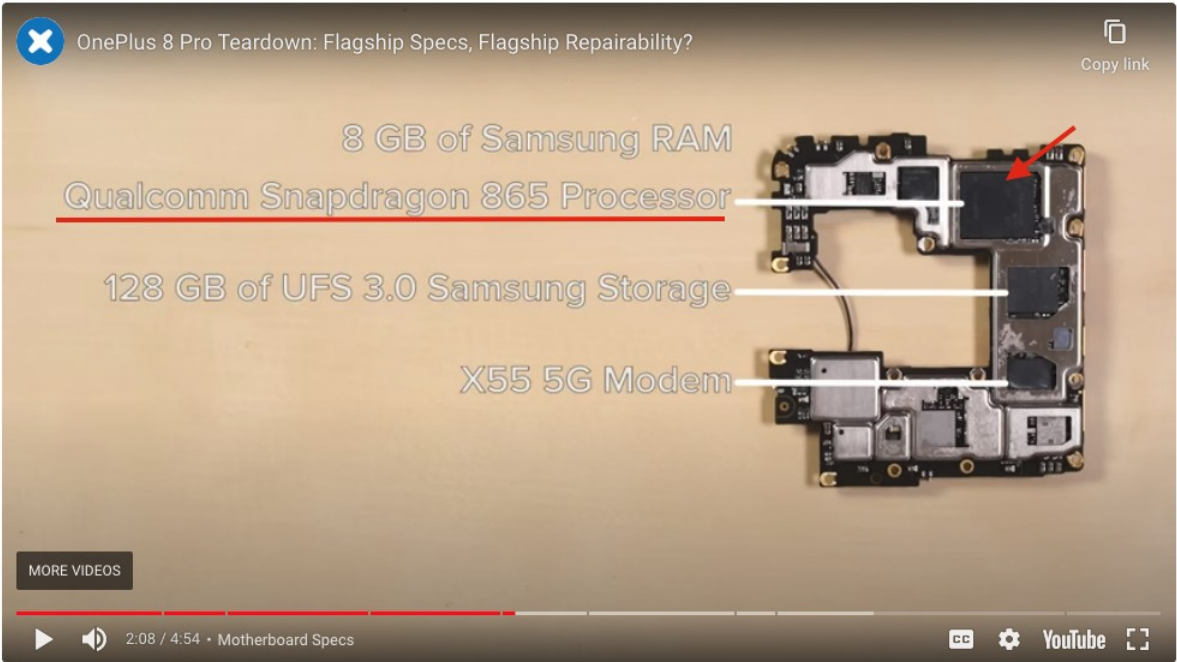


[4]



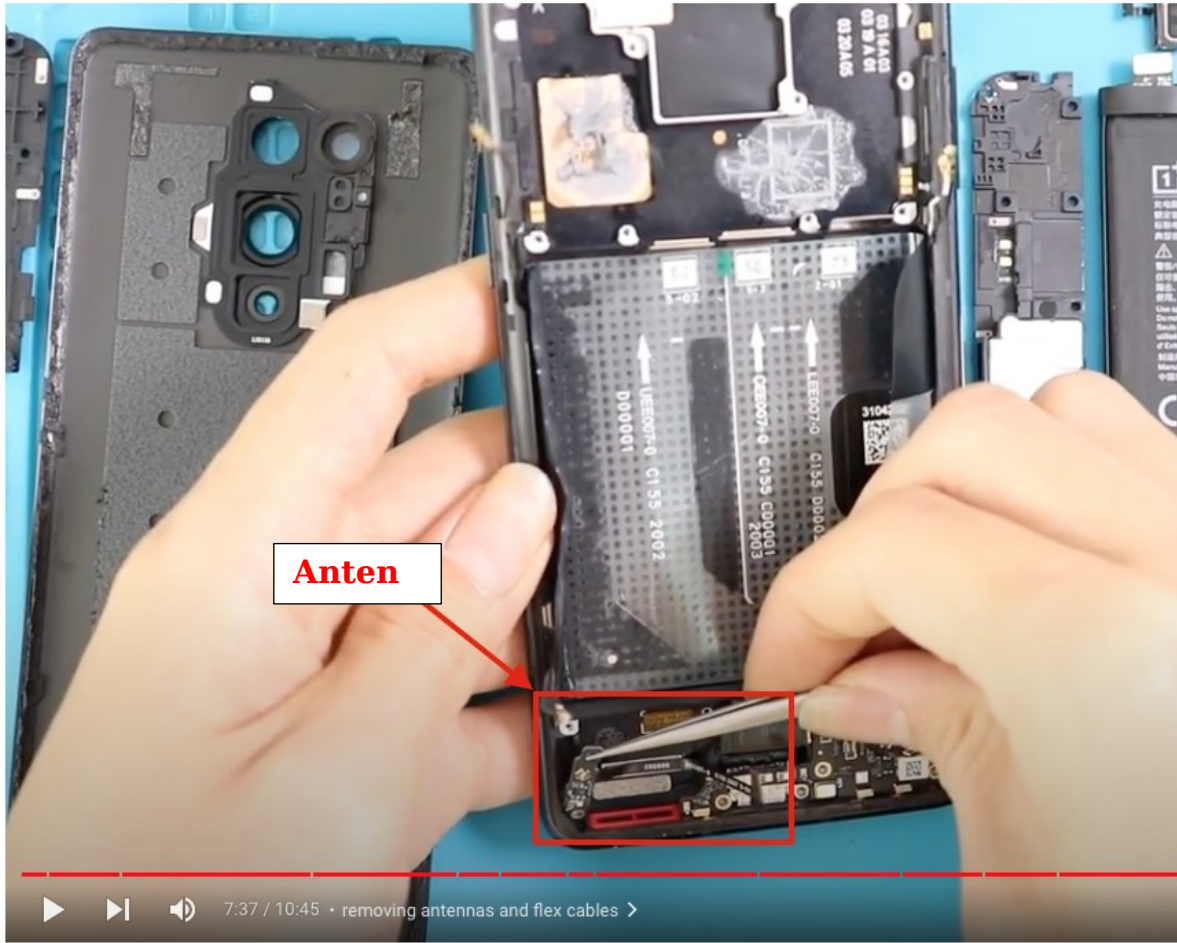


[4]

	<p>Video Overview</p>  <p>OnePlus 8 Pro Teardown: Flagship Specs, Flagship Repairability?</p> <p>8 GB of Samsung RAM</p> <p>Qualcomm Snapdragon 865 Processor</p> <p>128 GB of UFS 3.0 Samsung Storage</p> <p>X55 5G Modem</p> <p>MORE VIDEOS</p> <p>2:08 / 4:54 • Motherboard Specs</p> <p>YouTube</p>
<p>and such module comprising at least one antenna adapted for operation in the radio frequency range.</p>	<p>[4]</p> <p>The OnePlus the module of the smartphone includes at least one antenna adapted for operation in the radio frequency range.</p> <p>For example, the central module includes an RF antenna for cellular communications by the smartphone. The RF antenna is positioned at one corner of the central module.</p>

YouTube


Search





Anten

7:37 / 10:45 • removing antennas and flex cables >

Oneplus 8 Pro Teardown

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[5]

OnePlus - Smartphones (Models having cameras with IR sensitivity. See Product List at end for models)

Infringement of the '413 patent

Claim 9

9. A method of measuring the magnitude of electromagnetic radiation in a selected location by a mobile communication device, consisting of the steps of:

Evidence

The OnePlus smartphone performs a method of measuring the magnitude of electromagnetic radiation in a selected location.

For example, when the IR camera (5MP Color Filter Camera) is used to take an IR image the smartphone measures the magnitude of infrared electromagnetic radiation received by the IR camera from the location at which the IR camera is aimed.

For example, the OnePlus 8 Pro smartphone includes an IR camera, which is a smartphone module that is capable of measuring the magnitude of infrared electromagnetic radiation from a location at which the camera is aimed.



[1]

The OnePlus 8 Pro's Infrared Camera Can See Through Plastic and More

MAY 15, 2020 DL CADE



The new [OnePlus 8 Pro](#) is a great Android phone for lots of reasons. It's got a 120Hz display, Snapdragon 865, and a quad-camera system with not one, but two 48MP Sony sensors inside. But that's not why it's making headlines. It's making headlines because of its 5MP infrared camera, which can actually see *through* some materials.

[2]

	<p>This effect is made possible by the 5MP 'Color Filter' camera used to create what OnePlus has dubbed the 'Photochrom' effect. But that's just marketing speak. It's no mystery what this camera is: a sensor with the IR filter removed, so it can capture infrared light in addition to visible wavelengths.</p> <p>And while OnePlus expected this mode to be used to create false color images and unique landscape shots, an upshot of this feature is that certain materials like certain thin plastics become see-through, allowing you to see inside remote controls or an Apple TV as if you have X-Ray vision.</p> <p>[2]</p>
<p>providing a mobile communication device that comprises a housing, a digital imaging sensor having a first field of view, such sensor is for generating a digital image of the selected location,</p>	<p>The OnePlus smartphone further provides a mobile communication device that comprises a housing and a digital imaging sensor having a first field of view. The sensor is for generating a digital image of the selected location.</p> <p>For example, the OnePlus smartphone includes a housing for enclosing a digital image sensor, among other components of the smartphone. The digital image sensor has a field of view (e.g. outwards from the rear of the smartphone) and is for generating a digital image of a subject or location at which it is aimed.</p> <p>For example, the OnePlus 8 Pro has 48 MP Sony IMX689 image sensor within a housing.</p>

OnePlus 8 Pro

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Housing



[1]

Camera

Rear camera - Main

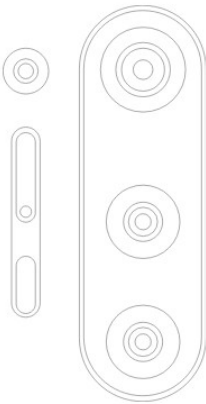
Sensor: Sony IMX689
Megapixels: 48
Pixel Size: 1.12 μm /48M; 2.24 μm (4 in 1)/12M
Lens Quantity: 7P
OIS: Yes
EIS: Yes
Aperture: f/1.78

Telephoto Lens

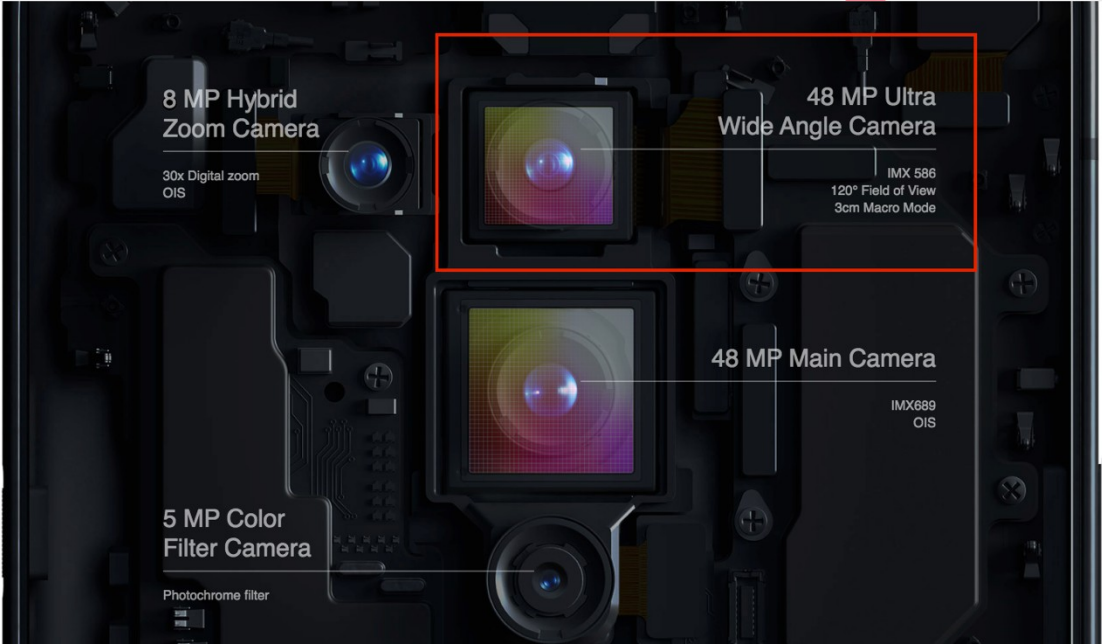
Megapixels: 8
Pixel Size: 1.0 μm
OIS: Yes
Aperture: f/2.44


Ultra Wide Angle Lens


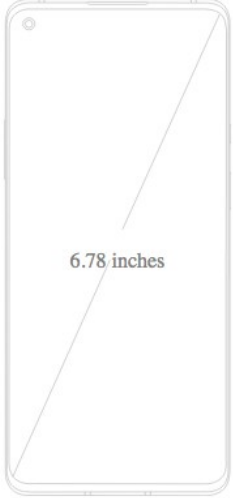
Megapixels: 48
Aperture: f/2.2
Field of View: 120°

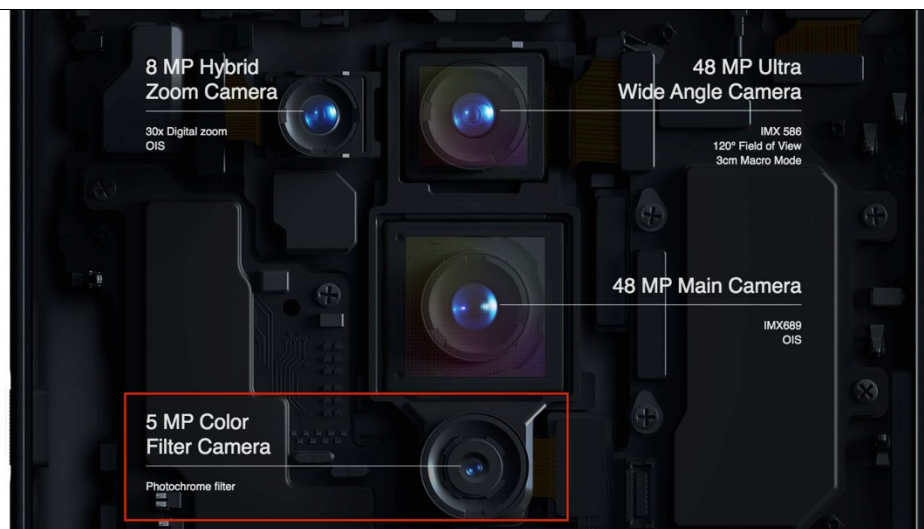


[1]

	<p>OnePlus 8 Pro OnePlus 8</p> <p>Overview Display Performance Camera Design Specs Reviews OxygenOS</p>  <p>The image shows the internal components of the OnePlus 8 Pro camera module. A red box highlights the 48 MP Ultra Wide Angle Camera (IMX 586) and the 48 MP Main Camera (IMX689). Other labeled components include the 8 MP Hybrid Zoom Camera (30x Digital zoom, OIS), the 5 MP Color Filter Camera (Photochrome filter), and the 120° Field of View 3cm Macro Mode.</p> <p>[1]</p>
<p>a computational means,</p>	<p>The OnePlus smartphone further provides a computational means.</p> <p>For example, the OnePlus 8 Pro includes a Qualcomm Snapdragon SoC CPU device that includes a main processor for performing computational processing.</p>

	<p><u>Performance</u></p> <p>Operating System: OxygenOS based on Android™ 10 CPU: Qualcomm® Snapdragon™ 865 5G Chipset: X55 GPU: Adreno 650 RAM: 8GB/12GB LPDDR5 Storage: 128GB/256GB UFS 3.0 2-LANE Battery: 4510 mAh (non-removable) Warp Charge 30T Fast Charging (5V/6A) 30W Wireless Charging</p>  <p>[1]</p>
and an output means for conveying information to an operator;	<p>The OnePlus smartphone further provides an output means for conveying information to an operator.</p> <p>For example, the OnePlus 8 Pro includes an AMOLED touchscreen display for conveying information to an operator.</p>

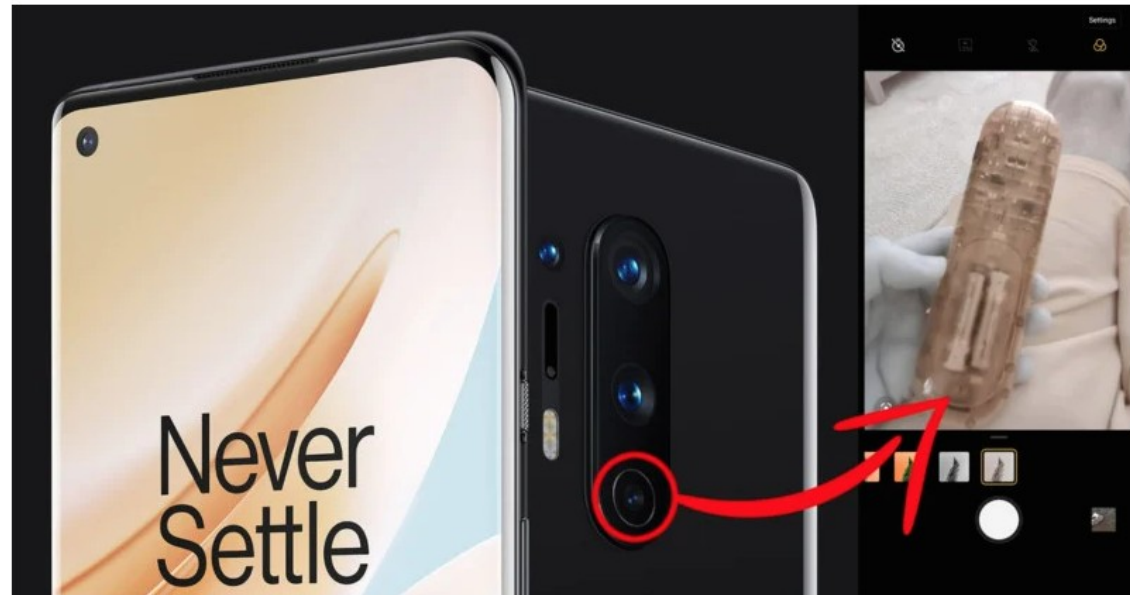
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<p>incorporating into the housing a module that is responsive to intensity of the electromagnetic radiation in a selected spectral range;</p>	<p>The OnePlus smartphone incorporates into the housing a module that is responsive to intensity of the electromagnetic radiation in a selected spectral range.</p> <p>For example, the OnePlus 8 Pro smartphone includes an IR camera, (e.g. the 5MP Color Filter Camera) which is a smartphone module that is capable of measuring the magnitude of electromagnetic radiation in the infrared range and is enclosed in the smartphone's housing.</p>



[1]

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🕒 MAY 15, 2020 👤 DL CADE



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	<p>This effect is made possible by the 5MP 'Color Filter' camera used to create what OnePlus has dubbed the 'Photochrom' effect. But that's just marketing speak. It's no mystery what this camera is: a sensor with the IR filter removed, so it can capture infrared light in addition to visible wavelengths.</p> <p>And while OnePlus expected this mode to be used to create false color images and unique landscape shots, an upshot of this feature is that certain materials like certain thin plastics become see-through, allowing you to see inside remote controls or an Apple TV as if you have X-Ray vision.</p> <p>[2]</p>
positioning the housing in a vicinity of the selected location;	<p>As directed by marketing and operational instructions, a user of the OnePlus smartphone positions the housing in a vicinity of the selected location when using the the IR camera.</p> <p>For example, the OnePlus 8 Pro smartphone includes an IR camera (5MP Color Filter Camera). In order to take an IR photo of a subject, the smartphone needs to be positioned so that the IR camera is in the vicinity of the subject and pointed at the subject.</p>

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[2]

generating by the
module a signal

The module of the OnePlus smartphone generates a signal representative of the electromagnetic radiation.

representative of the electromagnetic radiation;

For example, the IR camera in the OnePlus 8 Pro model generates a signal responsive to the infrared electromagnetic radiation received from the location or subject at which the IR camera is pointed. For example, the IR camera generates an IR image signal e.g. which when processed and displayed certain materials appear see-through because IR radiation penetrates them.

TECH / CIRCUIT BREAKER / ONEPLUS

OnePlus 8 Pro has an accidental X-ray vision filter that sees through plastic and clothes



Seeing into the guts of an Apple TV box. Images: [Ben Geskin](#) / [Twitter](#)


/ It's not actual X-ray, though, but infrared

By [JAMES VINCENT](#)

May 15, 2020, 5:49 AM EDT | [0 Comments](#) / [0 New](#)



[3]

	<p>Infrared sits right below visible light in the electromagnetic spectrum, and is sometimes referred to as “heat radiation,” because that’s how we feel its effects. The world is saturated in infrared, but because we don’t see it, we don’t usually think about it. About half of the energy that arrives on the Earth from the Sun arrives as infrared, for example.</p> <p>[3]</p>
processing said signal to extract information related to intensity of the electromagnetic radiation in the selected location, and	<p>The OnePlus smartphone processes the signal to extract information related to intensity of the electromagnetic radiation in the selected location.</p> <p>For example, the IR camera in the OnePlus 8 Pro model generates an IR image signal that is representative of the infrared electromagnetic radiation in the location at which the IR camera is pointed. The main processor in the SoC device processes the signal to extract information of the infrared electromagnetic radiation and provides the image to the user on the display of the smartphone.</p> <div> <p><u>Performance</u></p> <p>Operating System: OxygenOS based on Android™ 10 CPU: Qualcomm® Snapdragon™ 865 5G Chipset: X55 GPU: Adreno 650 RAM: 8GB/12GB LPDDR5 Storage: 128GB/256GB UFS 3.0 2-LANE Battery: 4510 mAh (non-removable) Warp Charge 30T Fast Charging (5V/6A) 30W Wireless Charging</p>  </div> <p>[1]</p>


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<p>sending said information to the output means for conveying the information to the operator.</p>	<p>The OnePlus smartphone sends the information to the output means for conveying the information to the operator.</p> <p>For example, the SoC device sends the information to the touchscreen display, which causes the display to display the IR image captured with the IR camera.</p>  <p>[2]</p>

Product List:

OnePlus 8 Pro

References:

[1] OnePlus Website - OnePlus 8 Pro

<https://www.oneplus.com/us/8-pro/specs?from=8pro>

[2] PetaPixel - The OnePlus 8 Pro's Infrared Camera Can See Through Plastic and More

<https://petapixel.com/2020/05/15/the-oneplus-8-pros-infrared-camera-can-see-through-plastic-and-more/>

[3] The Verge - OnePlus 8 Pro has an accidental X-ray vision filter that sees through plastic and clothes

<https://www.theverge.com/2020/5/15/21259723/oneplus-8-pro-x-ray-vision-infrared-filter-see-through-plastic>

[4] iFixit - OnePlus 8 Pro Teardown

<https://www.ifixit.com/Teardown/OnePlus+8+Pro+Teardown/133351>

[5] YouTube: Geardo - OnePlus 8 Pro Teardown

<https://www.youtube.com/watch?v=7txEX-SiPKY>